

To all our customers

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Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

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Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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# HAT1023R

## Silicon P Channel Power MOS FET High Speed Power Switching

# RENESAS

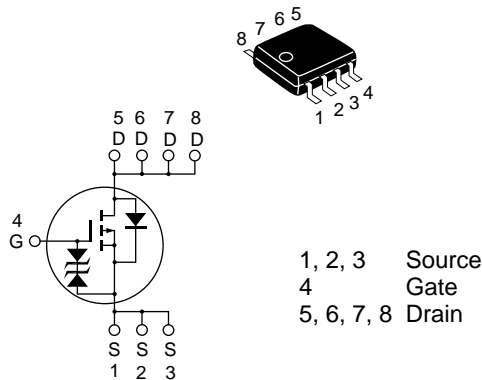
ADE-208-436G (Z)  
8th. Edition  
Jun. 1997

### Features

- Low on-resistance
- Capable of 2.5 V gate drive
- Low drive current
- High density mounting

### Outline

SOP-8



## Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	$V_{DSS}$	-20	V
Gate to source voltage	$V_{GSS}$	$\pm 10$	V
Drain current	$I_D$	-7	A
Drain peak current	$I_{D(pulse)}$ <sup>Note1</sup>	-56	A
Body-drain diode reverse drain current	$I_{DR}$	-7	A
Channel dissipation	$Pch$ <sup>Note2</sup>	2.5	W
Channel temperature	$Tch$	150	°C
Storage temperature	$Tstg$	-55 to +150	°C

Note: 1.  $PW \leq 10\mu s$ , duty cycle  $\leq 1\%$

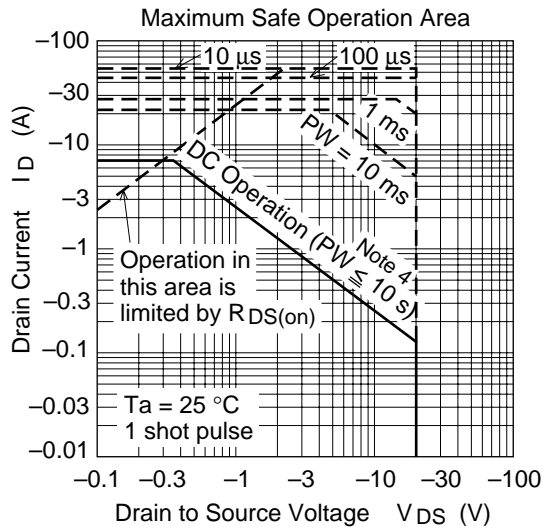
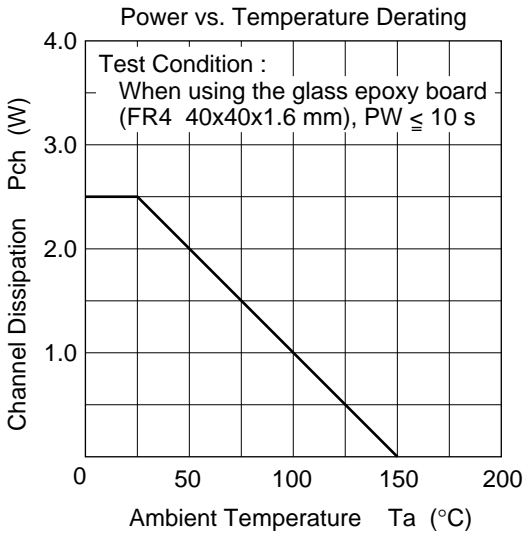
2. When using the glass epoxy board (FR4 40 x 40 x 1.6 mm),  $PW \leq 10s$

## Electrical Characteristics (Ta = 25°C)

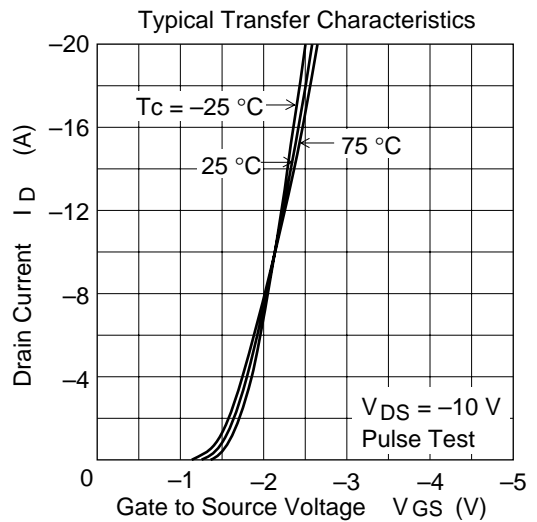
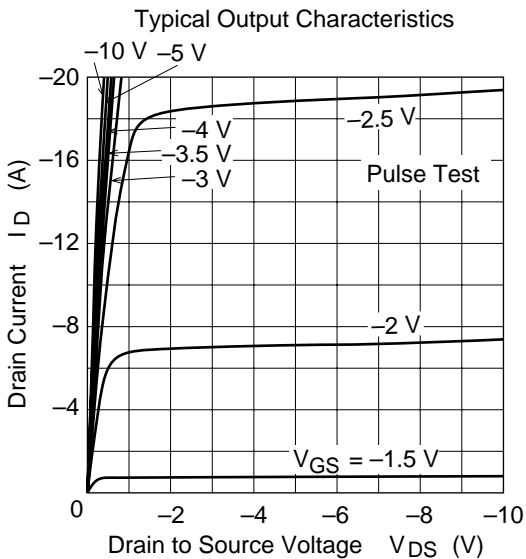
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	-20	—	—	V	$I_D = -10\text{mA}$ , $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	$\pm 10$	—	—	V	$I_G = \pm 100\mu\text{A}$ , $V_{DS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 8\text{V}$ , $V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	-10	$\mu\text{A}$	$V_{DS} = -20\text{V}$ , $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	-0.5	—	-1.5	V	$V_{DS} = -10\text{V}$ , $I_D = -1\text{mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.027	0.04	$\Omega$	$I_D = -4\text{A}$ , $V_{GS} = -4\text{V}$ <sup>Note3</sup>
	$R_{DS(on)}$	—	0.04	0.06	$\Omega$	$I_D = -4\text{A}$ , $V_{GS} = -2.5\text{V}$ <sup>Note3</sup>
Forward transfer admittance	$ y_{fs} $	9	14	—	S	$I_D = -4\text{A}$ , $V_{DS} = -10\text{V}$ <sup>Note3</sup>
Input capacitance	$C_{iss}$	—	2250	—	pF	$V_{DS} = -10\text{V}$
Output capacitance	$C_{oss}$	—	1120	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	$C_{rss}$	—	300	—	pF	$f = 1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	—	40	—	ns	$V_{GS} = -4\text{V}$ , $I_D = -4\text{A}$
Rise time	$t_r$	—	200	—	ns	$V_{DD} \cong -10\text{V}$
Turn-off delay time	$t_{d(off)}$	—	280	—	ns	
Fall time	$t_f$	—	220	—	ns	
Body-drain diode forward voltage	$V_{DF}$	—	-0.9	-1.4	V	$I_F = -7\text{A}$ , $V_{GS} = 0$ <sup>Note3</sup>
Body-drain diode reverse recovery time	$t_{rr}$	—	75	—	ns	$I_F = -7\text{A}$ , $V_{GS} = 0$ $di_F/dt = 20\text{A}/\mu\text{s}$

Note: 3. Pulse test

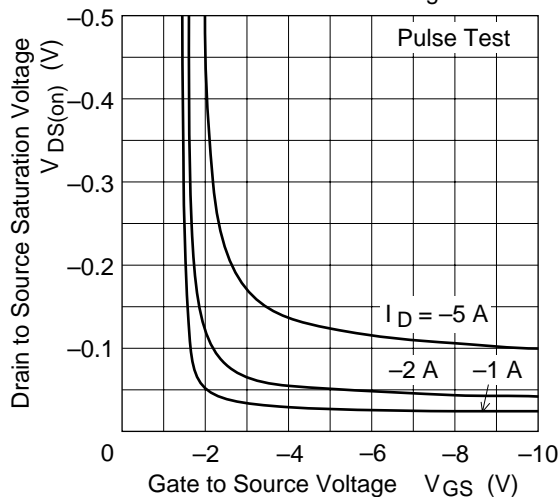
## Main Characteristics



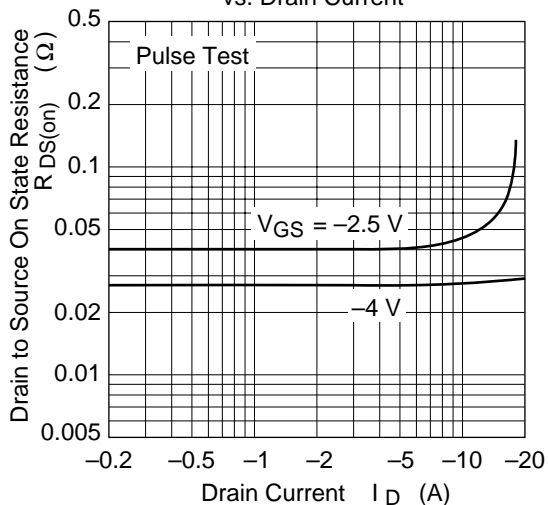
Note 4 :  
When using the glass epoxy board (FR4 40 x 40 x 1.6 mm)



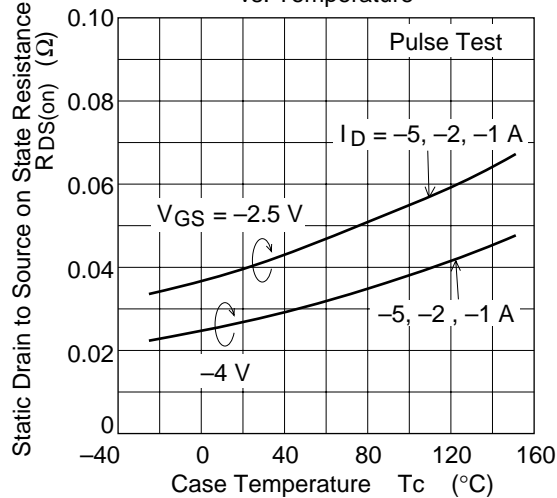
Drain to Source Saturation Voltage vs. Gate to Source Voltage



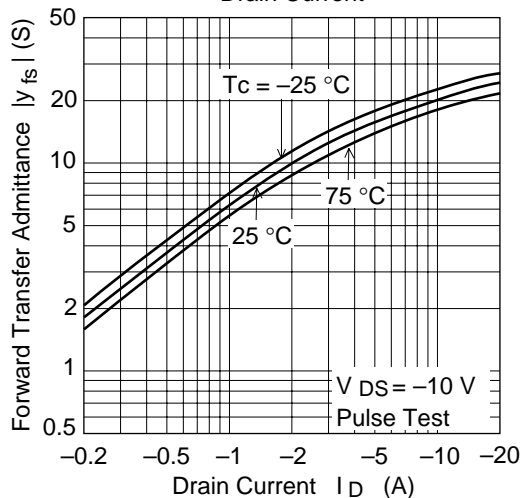
Static Drain to Source on State Resistance vs. Drain Current



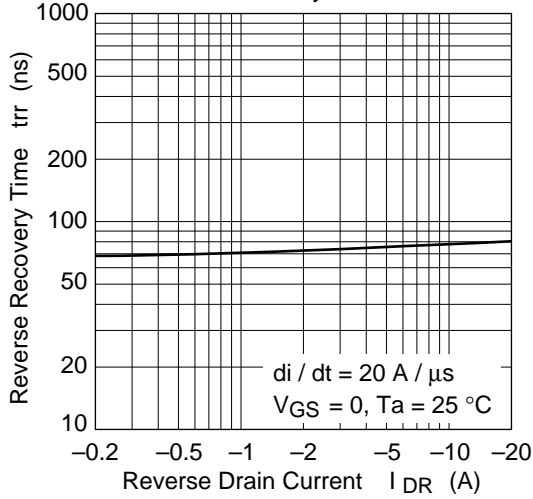
Static Drain to Source on State Resistance vs. Temperature



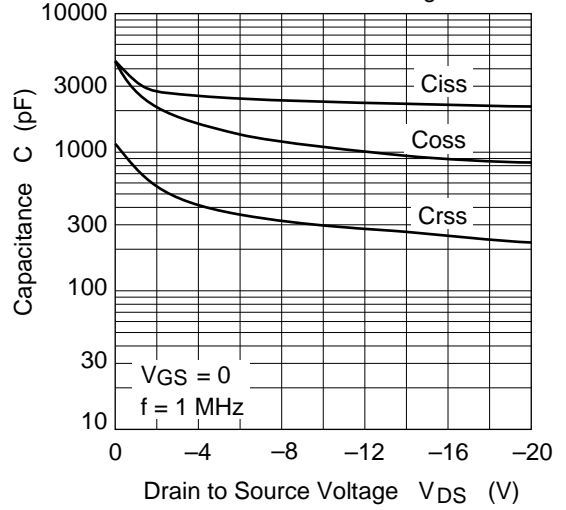
Forward Transfer Admittance vs. Drain Current



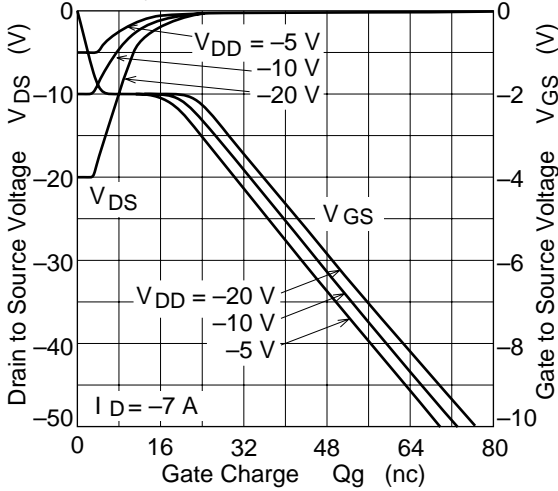
Body-Drain Diode Reverse Recovery Time



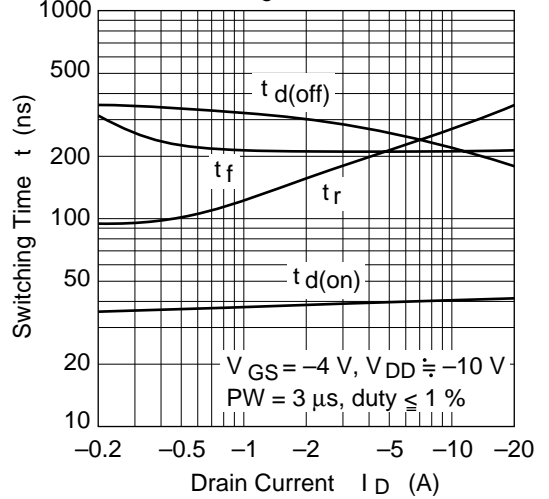
Typical Capacitance vs. Drain to Source Voltage



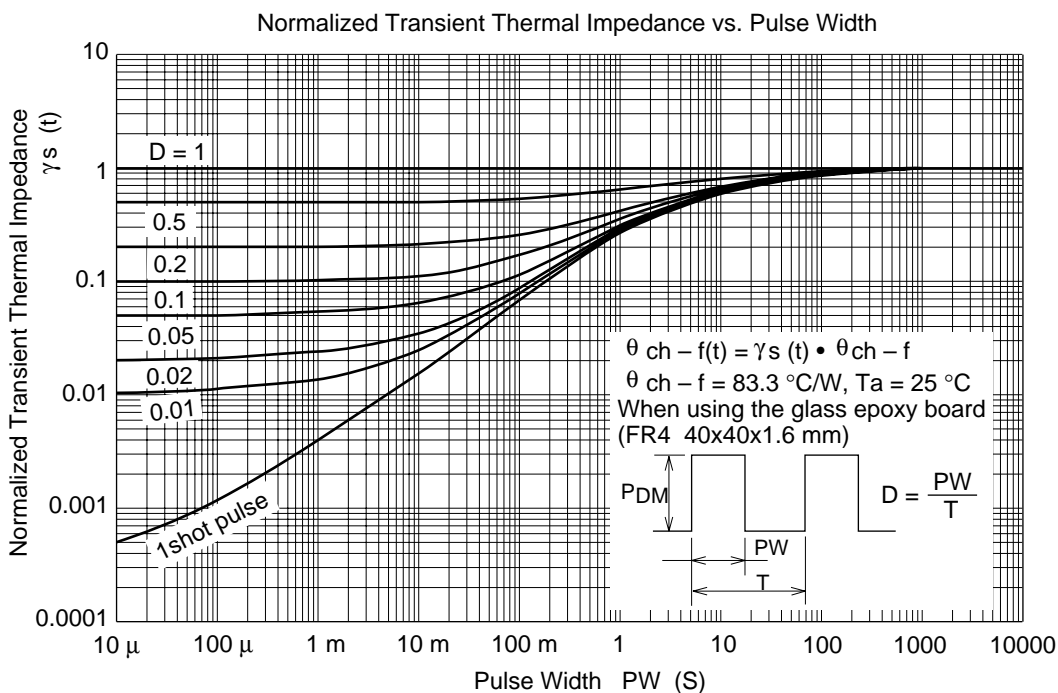
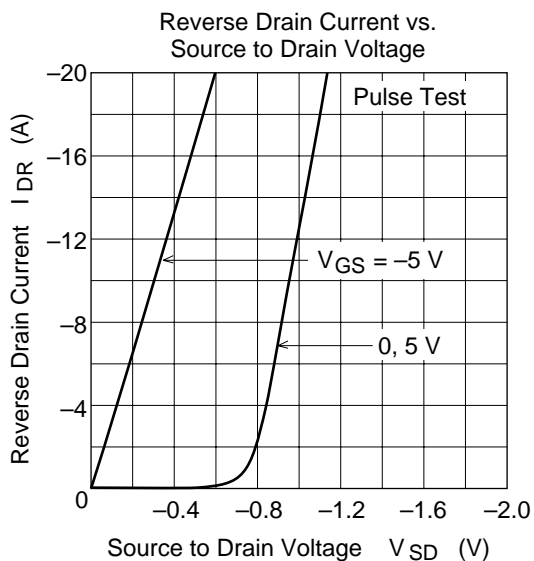
Dynamic Input Characteristics



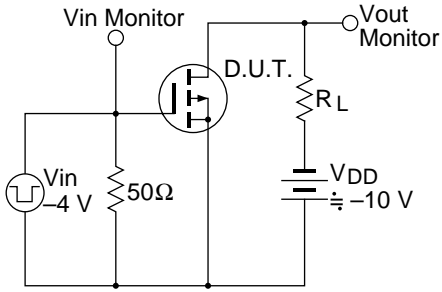
Switching Characteristics



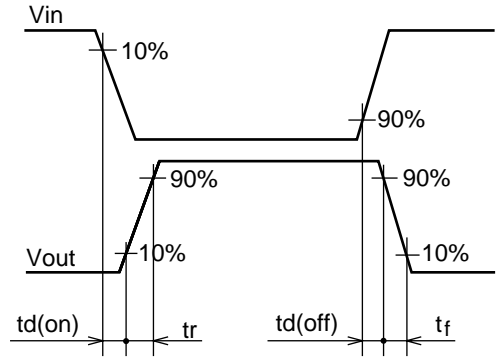




Switching Time Test Circuit

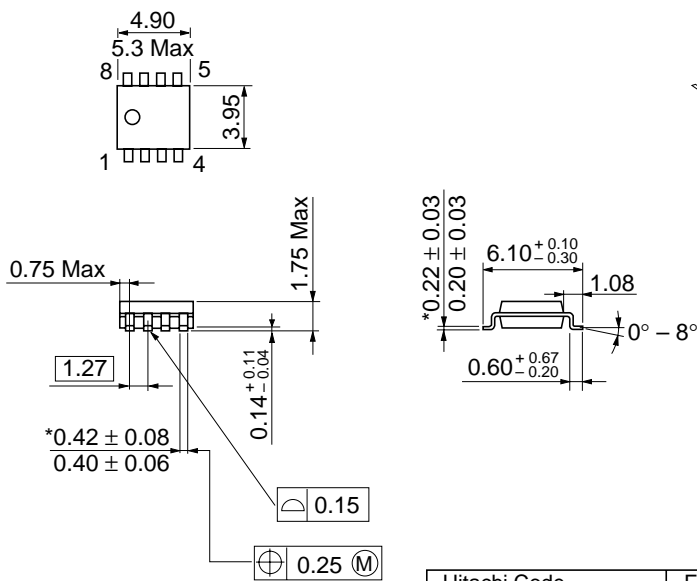


Switching Time Waveform



Package Dimensions

As of January, 2001  
Unit: mm



\*Dimension including the plating thickness  
Base material dimension

Hitachi Code	FP-8DA
JEDEC	Conforms
EIAJ	—
Mass (reference value)	0.085 g

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